

Appl. No. 10/634,772
Amendment dated June 21, 2007
Reply to Office Action of March 21, 2007

ASA-1144

RECEIVED
CENTRAL FAX CENTER

JUN 21 2007

REMARKS / ARGUMENTS

Claims 1-6 remain pending in this application. No claims have been canceled or added.

Priority

Applicants appreciate the Examiner's acknowledgment of the claim for priority and safe receipt of the priority document.

35 U.S.C. §112

With respect to the Examiner's rejections under this section, Applicants respond as follows. The waveform of a fetal heart is obtained by removing a magnetic field waveform generated by the heart of the pregnant female from a biomagnetic field waveform measured of the pregnant female (see Fig. 4, for example). This is not the same as the first template waveform which is created from the waveform of the fetal heart. According to an embodiment, the first template waveform is obtained by a sum-averaging process (see claim 4, for example). Therefore, the cross-correlation coefficient between the first template waveform from which the magnetic field waveform generated by the maternal heart is removed is not always equal to 1.0.

Appl. No. 10/634,772
Amendment dated June 21, 2007
Reply to Office Action of March 21, 2007

ASA-1144

Furthermore, the second template waveform is obtained from a magnetic field waveform generated by the heart of the pregnant female. According to an embodiment, it is obtained by using a sum-averaging process (see claim 5, for example). Nevertheless, the claims have been amended to improve clarity. Therefore, it is submitted that the claims satisfy the requirements of 35 U.S.C. §112.

35 U.S.C. § 103

Claims 1, 4 and 6 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kandori et al (U.S. Patent No. 6,269,262) in view of Holls et al (U.S. Patent No. 5,372,139) and further in view of Sternnickel (U.S. Pub. No. 2004/0260169). Claims 2, 3 and 5 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Kandori et al in view of Holls et al in view of Sternnickel and further in view of Deans et al (U.S. Patent No. 5,666,959). These rejections are traversed as follows.

The present invention is directed to a biomagnetic field measuring apparatus in which a processing unit performs a process of removing a magnetic field waveform generated by a mother's heart from a biomagnetic field that is measured. A first template waveform is obtained of a magnetic field waveform generated by a fetal heart by removing the magnetic field waveform generated by the maternal heart. A waveform of a cross-correlation coefficient between the waveform from which the magnetic field waveform generated by the maternal heart has been

Appl. No. 10/634,772
Amendment dated June 21, 2007
Reply to Office Action of March 21, 2007

ASA-1144

removed and the first template waveform is obtained. Peaks from the waveform of the cross-correlation coefficient are detected and the timings at which these peaks occur are displayed on a display unit.

None of the cited references disclose these features of the presently claimed invention. For example, Kandori et al disclose a biomagnetic field measuring apparatus in which "an echo signal obtained from the transmitting/receiving part and electronic scanning part 9 is signal-processed by a signal processor (not shown) to provide image data which in turn is stored in an image memory part 10 and displayed, as an ultrasonic image, on the monitor display 80 arranged internally of the shielded room 1". Holls et al disclose the removal of a maternal electrocardiogram signal from an electrocardiogram signal that includes the maternal electrocardiogram signal and a fetal electrocardiogram signal. However, there is no disclosure with respect to the detecting of a fetal heart rate (see Figs. 5A-5C). Sternnickel discloses a method of reducing noise by using a wavelet transform (see Fig. 1). Finally, Deans et al disclose that a fetal heart rate is detected from electrocardiogram data by using a baseline correction and a linear regression function.

However, none of the cited references disclose a process of obtaining a waveform of a cross correlation coefficient between the waveform of the fetal heart and the first template waveform, as recited in the claims. According to the present invention, even though a minute magnetic waveform generated by a fetal heart,

Appl. No. 10/634,772
Amendment dated June 21, 2007
Reply to Office Action of March 21, 2007

ASA-1144

RECEIVED
CENTRAL FAX CENTER
JUN 21 2007

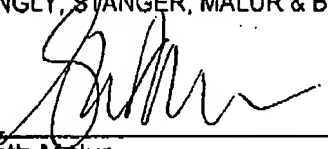
whose baseline drifts, is detected, peaks of each of the waveforms such as the P wave, QRS wave and T wave generated by the electric activity of the fetal heart are stably obtained with high sensitivity (see specification, page 5, lines 10-16). These advantages cannot be realized by any of the cited references. Therefore, it is submitted that the pending claims patentably define the present invention over the cited art.

Conclusion

In view of the foregoing, Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

MATTINGLY, STANGER, MALUR & BRUNDIDGE, P.C.

By 
Shrinath Malur
Reg. No. 34,663
(703) 684-1120